UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER OF PATENTS AND TRADEMARKS
Washington, D.C. 20231
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/577,166	05/24/2000	Richard L. Sutherland	SAIC0006-US	5232

27510 7590 04/04/2003

KILPATRICK STOCKTON LLP
607 14TH STREET, N.W.
SUITE 900
WASHINGTON, DC 20005

EXAMINER
ANGEBRANNDT, MARTIN J

ART UNIT	PAPER NUMBER
1756	

DATE MAILED: 04/04/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/577,166	SUTHERLAND ET AL.	
	Examiner	Art Unit	
	Martin J Angebranndt	1756	

-- The MAILING DATE of this communication app ars on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *30 July 2002* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-48* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-48* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

1. In view of the appeal brief and accompanying data/appendices filed on 7/30/2002, PROSECUTION IS HEREBY REOPENED. New grounds of rejection are set forth below.

To avoid abandonment of the application, appellant must exercise one of the following two options:

(1) file a reply under 37 CFR 1.111 (if this Office action is non-final) or a reply under 37 CFR 1.113 (if this Office action is final); or,

(2) request reinstatement of the appeal.

If reinstatement of the appeal is requested, such request must be accompanied by a supplemental appeal brief, but no new amendments, affidavits (37 CFR 1.130, 1.131 or 1.132) or other evidence are permitted. See 37 CFR 1.193(b)(2).

2. Responses to the arguments offered by the applicant are presented after the first rejection to which they are directed. Rejections of the previous office action not appearing below are withdrawn. The applicant agrees on page 5 of the brief that the term "variable diffraction efficiency" refers to holograms, which are able to change or vary their diffraction efficiency after recording.

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 44, 47 and 48 are rejected under 35 U.S.C. 112, first paragraph, because the specification, while being enabling for holograms having variable diffraction efficiency, does not reasonably provide enablement for other holograms being turned on and off. The specification

does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to practice the invention commensurate in scope with these claims.

In claim 44, the applicant should - - with variable diffraction efficiency- - after "second holographic blank" and "second master hologram".

In claims 47 and 48, the applicant should - - each with variable diffraction efficiency- - after "first, second and third holographic blank" and "first, second and third master hologram"

5. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

6 Claims 32-35 and 37-40 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sturdevant '946, in view of Redfield '861, Hall et al. '326 and Amako et al. '214.

Sturdevant '946 teaches a continuous process where the holographic recording medium is preexposed without any pattern using UV light (21), Then the hologram is exposed using a laser and contact exposure through a holographic master (85) and then post exposed using a UV lamp. (91). The use of protective layers and a substrate is also disclosed with respect to figure 1.

Redfield '861 teaches that the precure to deplete the oxygen and reduce the induction period is disclosed. (10/5-11) If the holographic recording medium is not used soon after the precure, then it needs to be repeated but without causing polymerization as that would reduce the exposure range and hence possible diffraction efficiency of the hologram. (1/66-2/14 and 2/43-

53) Similarly the fixation exposure can be carried out using the reference beam (12/1-20). The use of spatial light modulators is disclosed with respect to figure 1.

Hall et al. '326 teaches the use of either optically or computer generated holograms for contact copying. (10/48-50).

Amako et al. '214 teaches the generation of computer generated holograms using liquid crystal devices. (15/50-53 and 16/29-37) The replay of several holograms having different focal lengths in sequence to form the desired article is disclosed. (16/33-37).

It would have been obvious to one skilled in the art to modify the process of Sturdevant '946 by replacing the three exposure units with one exposure unit capable of performing both the interferometric exposure and the uniform exposures by replacing the holographic master used in the contact exposure with an LC device capable of recording computer generated holograms to save in equipment costs based upon the disclosure of equivalence for the use of lasers to provide the precure and fixation exposures by Redfield '861 for the same effect and the teachings of Hall et al. '326 that the use of optically produced or computer generated hologram in contact copying processes is equivalent. Further the teachings of Amako et al. '214 establish that in addition to the equivalence in functionality as a hologram the use of a computer to generate the holograms allows the holographic image of the master to be rapidly changed so that a plurality of different holographic images and copies thereof may be formed without the effort of creating an optical master.

The applicant argues that none of the references teach the use of a master hologram for copying where the master can be varied in its diffraction efficiency. The examiner disagrees, noting that Hall et al. '326 and Amako et al. '214 both teach computer generated holograms in

LC media. The Hall et al. reference specifically teaches the use of computer generated holograms for copying processes and Amako et al. '214 teaches means for their generation as well as the advantage that a number of different holograms can be replayed without moving the master or the need to generate a optically produced master. These are clear advantages to the use of computer generated holograms in LC materials as the masters. The rejection stands

The examiner agrees that Sturdevant '946 and Redfield '861 relates to acryl ate based holographic recording media and their use and that these hologram are not able to vary/change their diffraction efficiency after recording/formation. The examiner agrees that the formation of the master hologram and the copying or replication of a hologram are reasonably considered two steps. The language "Any additional holograms can be copied by contact printing", should not be read as the applicant suggests as it is clear that the master is used in the copying process as the original, but should be read as inferring that "any additional holograms desired may be copied by contact printing" **the master**. Clearly the master hologram is a hologram used as the original in a copying process, so the examiner's position is clearly the appropriate interpretation. The examiner stands by the interpretation of Hall et al. as teaching the use of either computer or optically generated holograms as masters in holographic copying processes and fully recognizes that specific computer generated holograms are not disclosed.

The applicant might want to revise insert D of appendix A of the appeal brief as it indicates that the Amako et al. '214 reference forms a hologram, but not by contact copying, where the discussion on pages 7 and 8 of the brief has it forming a non-holographic image. In figure 25 of that reference several holograms are formed at different focal lengths. These are flat images projected at a distance in series to form a three dimensional image at a distance. The

holographic images of the claims may be flat as no language excludes this. The examiner fully appreciates the differences in the structure of the LCD device of Amako et al. '214 and PDLC holograms shown in figures 1-6 of appendix B. The examiner also is aware of the differences in the resolution or fineness of pitch achievable using these systems illustrated in figures 10-14 and argued on pages 10-14 of the brief. There is a reference on the record that states that it formed a holographic image in an ECB mode LCD. The discussion of TFT's and other LCD devices does not seem particularly relevant as they differ in structure. The examiner notes that the claims are currently open to the use of any variable holographic element and seek coverage for this entire scope. The applicant is correct that the holograms formed in the LCD medium of Amako et al. '214 are poorer in quality that the PDLC materials, but the claims currently embrace both. Therefore the showing is not commensurate with the scope of coverage sought. **Only claims lacking recitation of PDLC materials as the variable holographic material are rejected under this heading and inclusion of these limitation would obviate this ground of rejection.**

With respect to figures 8,16 and 9 and in the discussion on pages 14-21, the applicant seems to miss the nuances of contact printing of holograms. Ikeda et al. EP 0087281 shows in figure 6, the master and the copy hologram spaced apart for illustration purposes. (see 8/12-9/15) The focused image is formed by the interaction of the 17 and 18 at a distance and the focus is outside the thickness of the copy material. The replication by contact copying a hologram relies upon the interference of the transmitted beam (18, zero order diffraction) and the first order diffracted light (17) in the thickness of the copy material to replicate the fringe spacing and orientation of the master so that when the copy is replayed, it replays at the same distance from the copy medium as the image does from the holographic master. Spacing these apart would

change the replay distance. Therefore both optical and computer generated holograms are made to replay at a distance and their copies replay at the same distance as well. Therefore the far field/ near field arguments are without merit. Clearly, the acryl ate based holographic recording materials of Sturdevant '946 and Redfield '861 have the ability to form much finer images than achievable with the LCD materials of Amako et al. '214 and would be able to accurately reproduce the poor quality computer generated LCD holograms of Amako et al. '214. The examiner notes that acryl ate materials are used in the instant invention (see specification). The examiner notes that even embossed gratings (surface, Raman-Nath grating) may be copied by near contact methods and that this is old and well known in the art. (See Haines et al. '445, figure 10 and text at 6/19-45). Therefore the argument of Raman-Nath gratings theoretically not being able to be reproduced by contact or proximity copying is not persuasive.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The examiner recognizes that no one of the reference teach the invention and that is why several references are used and the teachings upon which they are relied upon is discussed in the rejection.

7 Claim 22 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chang '045, in view of Ikeda et al. EP 0087281 and Sutherland et al. WO98/04650.

Chang '045 discloses the formation of edge faded holograms, where the diffraction efficiency decreases from the center toward the periphery. This reduces the visibility of the edges of the hologram, thereby reducing the obstructions to visibility of the driver (1/28-30, 1/50-54

and 2/10-13). This method reduces the coherence of the laser light used in the two beam exposure process so that equal amounts of expose occur throughout the holographic recording medium, but the percentage of interferometric exposure is reduced at the edges (5/42-67, 7/59-67 and 8/5-19). The reduced coherence light fails to form interference patterns and yields an essentially incoherent exposure at the edges. (2/40-48).

Ikeda et al. EP 0087281 teaches with respect to figure 5 a master hologram, which is placed in close contact with a photosensitive layer and exposed to form a copy hologram. Figure 6 shows the formation of the diffracted beam and the passage of some of the transmitted beam, which acts as a reference beam. Figure 15-17 show scanning of the laser beam.

Sutherland et al. WO98/04650 teaches PDLC holographic recording media, which are used to record gratings. The use of two beam exposure processes with these materials is disclosed. (8/15-30 and 9/19-33) . The compositions are disclosed as using a photopolymerizable monomer, a second phase material, a photoinitiator, a co-initiator, a chain extender (or crosslinker) and optionally a surfactant. Useful photopolymerizable materials including mixtures of di, tri, tetra and penta acrylates, such as triethylethylene glycol diacrylate, trimethyolpropane triacrylate, pentaerythritol triacrylate, pentaerythritol tetracrylate, pentaerythritol pentacrylate and the like. (10/14-27) The use of dipentaerythritol hydroxypentacrylate is disclosed. (11/12). Useful second phase materials are described as LC materials and include E7 and cyanobiphenyls (10/28-11/26 and 19/1-22/16) . Useful photoinitiators including rose Bengal esters, fluoresceins, cyanine dyes are disclosed. (11/36-12/16) Useful co-initiators including N-phenyl glycine are disclosed. (12/17-32) Useful crosslinker/chain extenders including vinyl monomers, such as N-vinyl pyrrolidone are

disclosed. (12/33-13/8) Surfactants lower the operating voltage and useful surfactants include octanoic acid. (13/9-14/13). The recording media are placed between ITO coated slides as discussed on pages 15 and 11 and through application of voltage through these ITO electrodes are electrically switchable to control the birefringence and transmittance of the LC material within the cured polymeric matrix. Useful amounts of the various components are disclosed on page 17. The stacking of these containing multiple gratings is disclosed on page 28 with respect to figure 17. The disclosure of these for application where holographic images are desired to be switchable is disclosed. (28/31-29/3). The formation of either reflection or transmission switchable holograms is disclosed (4/30-32).

It would have been obvious to one skilled in the art to modify the process of forming edge faded holograms taught by Chang '045 by using contact copy methods such as those disclosed by Ikeda et al. EP 0087281 to obviate the need to a two beam exposure apparatus and to use the PDLC holograms of Sutherland et al. WO98/04650 as the master transmission hologram to obviate the need for diffusers of the like by coordinating the location of the laser beam used in the scanning copy process of Ikeda et al. EP 0087281 with the diffraction efficiency desired in that portion of the holographic copy. In the case Chang '045, interference pattern formation is prevented at the edges by rendering the percentage of exposure less coherent in these areas which is the same effect achieved by reducing the diffraction efficiency of the grating when exposure of the edge regions occurs as more of the light merely passes through the hologram when the diffraction efficiency is reduced.

8 Claim 1-11, 22-31 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang '045, in view of Ikeda et al. EP 0087281 and Sutherland et al. WO98/04650, further in view of Margerum et al. '568.

Margerum et al. '568 teaches the use of a contact exposure through a grating mask to form diffraction gratings in PDLC recording materials. The use of a second exposure after the masked exposure is also disclosed with respect to figure 1. (5/5-57) The alternative use of a two beam holographic interference exposure is disclosed. (5/53-57, 2/27-31 and 2/54-59) The PDLC materials are coated between ITO coated glass films. (4/57-5/57). The recording of holographic patterns is emphasized. (11/33-41).

It would have been obvious to one skilled in the art to modify the invention of Chang '045 combined with Ikeda et al. EP 0087281 and Sutherland et al. WO98/04650 by further replacing the holographic recording material of Ikeda et al. EP 0087281 or Chang '045 with a PDLC holographic recording material to produce a switchable hologram with faded edges so that it could be turned off when it was not desired to be in the drivers view and processing without the need for wet development.

9 Claim 1-43 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang '045, in view of Ikeda et al. EP 0087281 and Sutherland et al. WO98/04650, further in view of Margerum et al. '568 and either Eguchi et al. JP 03-188479 or Wreede et al. '118.

Eguchi et al. JP 03-188479 teaches the contact copying of the reflection hologram where the incident beam (4) passes through the recording medium (32) and is diffracted to form beam (41) by the underlying reflection hologram (22).

Wreede et al. '118 teaches the contact copying of the reflection holograms (225 and 229) where the incident beam (RB2) passes through the recording medium (235) and is diffracted to form beam (DB2) by the underlying reflection hologram.

In addition to the basis provided above, the examiner holds that it would have been obvious to modify the process of Chang '045 combined with Ikeda et al. EP 0087281, Sutherland et al. WO98/04650 and Margerum et al. '568 use reflection PDLC holograms and the arrangement of either Eguchi et al. JP 03-188479 or Wreede et al. '118 to form reflective edge faded holograms.

10 Claim 22, 32-40 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sturdevant '946, in view of Redfield '861, Margerum et al. 218 and Sutherland et al. WO98/04650.

Margerum et al. '218 teaches the use of a precure to overcome the induction period in photopolymerizable materials. (2/33-39).

It would have been obvious to one skilled in the art to modify the process of Sturdevant '946 by keeping the protective and substrate layers and performing the pre-exposure at a longer wavelength using the laser to reduce the induction period of the polymerizable medium and use the laser to perform the fixation exposure based upon the teachings of Redfield '861 and Margerum et al. 218 and further to use the PDLC holograms of Sutherland et al. WO98/04650 with the grating pattern to be turned on during the holographic exposure and off during the pre-exposure and fixation exposure to reduce the time between the pre-exposure and the holographic exposure which is disclosed by Redfield '861 as critical.

11 Claim 1-11,22-43 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sturdevant '946, in view of Redfield '861, Margerum et al. 218 and Sutherland et al. WO98/04650, further in view of Margerum et al. '568.

It would have been obvious to one skilled in the art to modify the invention of Sturdevant '946, in view of Redfield '861, Margerum et al. 218 and Sutherland et al. WO98/04650 by further replacing the holographic recording material of Sturdevant '946, Redfield '861 or Margerum et al. 218 with a PDLC holographic recording material to allow switchable holograms to be produced with all the exposures performed with the master and the holographic recording medium in contact and thereby gain the advantages of the reduced delay between the different exposure steps discussed above.

12 Claim 1-43 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sturdevant '946, in view of Redfield '861, Margerum et al. 218 and Sutherland et al. WO98/04650, further in view of Margerum et al. '568 and either Eguchi et al. JP 03-188479 or Wreede et al. '118.

In addition to the basis provided above, the examiner holds that it would have been obvious to modify the process of Sturdevant '946 combined with Redfield '861, Margerum et al. 218, Sutherland et al. WO98/04650 and Margerum et al. '568 use reflection PDLC holograms and the arrangement of either Eguchi et al. JP 03-188479 or Wreede et al. '118 to form PDLC holographic copies of reflective PDLC holograms.

13 The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Ingwall et al. '912 teaches the formation of holograms in acryl ate based holographic recording materials followed by infusion of the voids in the hologram to form switchable holograms (2/29-55). The use of polymerization induced phase separation of the cured polymer and the liquid crystal materials is disclosed as known (1/45-53)

Haines et al. '445 teaches in figure 10 and text at 6/19-45 that even embossed gratings may be copied by near contact methods and that this is old and well known in the art.

14 Claims 44,45,47 and 48 are allowable over the prior art, but rejected under 35 USC 112.

15 Any inquiry concerning this communication or earlier communications from the examiner should be directed to Martin J Angebranndt whose telephone number is 703-308-4397. The examiner can normally be reached on Mondays-Thursday and alternative Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Mark Huff can be reached on 703-308-2464. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9310 for regular communications and 703-872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0661.

Martin J Angebranndt
Primary Examiner
Art Unit 1756

Mark Huff
Supervisory Patent Examiner
Art Unit 1756

November 15, 2002